CLAIMS

We Claim:

1. A composition of red blood cells comprising:
red blood cells suspected of containing a pathogen wherein the red blood cell composition has been treated such that the pathogen is substantially inactivated and wherein red blood cell antigens are substantially masked so that the transfusion of the treated red blood cells into an antigen mismatched animal would result in a reduced immune reaction compared to the immune reaction of the transfusion of an untreated red blood cell composition, wherein the treated red blood cell composition is suitable for *in vivo* use.

2. The composition of claim 1, wherein *in vivo* survival of the red blood cells after circulating for 24 hours following transfusion is greater than 75%.

3. The composition of claim 2, wherein said *in vivo* survival of greater than 75% is maintained after storage of the red blood cells for up to 14 days at 4 °C.

4. The composition of claim 2, wherein said *in vivo* survival of greater than 75% is maintained after storage of the red blood cells for up to 35 days at 4 °C

5. The composition of claim 2, wherein said *in vivo* survival of greater than 75% is maintained after storage of the red blood cells for up to 42 days at 4 °C

6. The composition of claim 1, wherein the red blood cell antigens that are substantially masked are minor antigens.

7. The composition of claim 1, wherein when the red blood cells are Rh positive, *in vitro* binding of anti-D antibody to the treated red blood cells is reduced by at least 90% compared to the untreated red blood cells.

8. The composition of claim 1, wherein when the red blood cells are Rh positive, *in vitro* binding of anti-D antibody to the treated red blood cells is reduced by at least 95% compared to the untreated red blood cells.

9. The composition of claim 1, wherein when the red blood cells are Rh positive, *in vitro* binding of anti-D antibody to the treated red blood cells is reduced by at least 99% compared to the untreated red blood cells.

10. The composition of claim 1, wherein when a pathogen is present, at least 3 logs of said pathogen has been inactivated.

11. The composition of claim 10, wherein said pathogen is a bacterium.

12. A composition of red blood cells comprising:
red blood cells suspected of containing a pathogen wherein the red blood cell composition has been treated with a compound having an affinity for nucleic acids and an effector group that reacts to bond covalently to the nucleic acid such that the pathogen is substantially inactivated and wherein the red blood cell composition has been reacted with an antigen masking compound such that the red blood cell antigens are substantially masked such that the transfusion of the treated red blood cells into an antigen mismatched animal would result in a reduced immune reaction compared to the immune reaction of the transfusion of an untreated red blood cell composition, wherein the treated red blood cell composition is suitable for *in vivo* use.

13. The composition of claim 12, wherein said compound having an affinity for nucleic acids comprises a nucleic acid binding ligand.

14. The composition of claim 13, wherein said effector group is selected from the group consisting of a mustard group and a mustard group equivalent.

15. The composition of claim 14, wherein said antigen masking compound comprises polyethylene glycol.

16. The composition of claim 14, wherein said antigen masking compound comprises a polyethylene glycol derivative.

17. The composition of claim 14, wherein said antigen masking compound is selected from the group consisting of an activated polyethylene glycol and an activated polyethylene glycol derivative.

18. The composition of claim 12, wherein said compound having an affinity for nucleic acids is selected from the group consisting of quinacrine mustard and β-alanine, N-(acridin-9-yl), 2-[bis(2-chloroethyl) amino]ethyl ester and wherein the antigen masking compound is selected from the group consisting of 2,2,2-trifluoroethanesulphonyl monomethoxy polyethylene glycol, N-hydroxy succinimide propionic acid monomethoxy polyethylene glycol, and N-hydroxy succinimide butanoic acid monomethoxy polyethylene glycol.

19. The compostion of claim 18, wherein said compound having an affinity for nucleic acids is β-alanine, N-(acridin-9-yl), 2-[bis(2-chloroethyl) amino]ethyl ester.

20. An *ex vivo* method of treating a red blood cell composition comprising:
(a) contacting the red blood cell composition with a compound that substantially inactivates a pathogen that may be present in the composition, under conditions that result in substantial inactivation of the pathogen present, if any; and
(b) contacting the red blood cell composition with a compound that binds to the red blood cells and substantially masks red blood cell antigens under conditions that significantly reduce the immunogenicity of the red blood cells such that transfusing the red blood cell

composition into an antigen mismatched animal would result in a reduced immune reaction compared to the immune reaction of transfusing an untreated red blood cell composition.

21. The method of claim 20, wherein said compound that inactivates a pathogen has an affinity for nucleic acids.

22. The method of claim 21, wherein said compound that inactivates a pathogen comprises an effector group that reacts to bond covalently to the nucleic acid.

23. The method of claim 22, wherein said compound that inactivates a pathogen comprises a nucleic acid binding ligand.

24. The method of claim 23, wherein said effector group is selected from the group consisting of a mustard group and a mustard group equivalent.

25. The method of claim 20, wherein said compound that binds to the red blood cells comprises polyethylene glycol.

26. The method of claim 20, wherein said compound that binds to the red blood cells comprises a polyethylene glycol derivative.

27. The method of claim 20, wherein said compound that binds to the red blood cells is selected from the group consisting of an activated polyethylene glycol and an activated polyethylene glycol derivative.

28. A method of using the composition of Claim 1 comprising delivery of the composition into an individual in need of a red blood cell transfusion.

29. A method of using the composition of Claim 2 comprising delivery of the composition into an individual in need of a red blood cell transfusion.

30. A method of using the composition of Claim 7 comprising delivery of the composition into an individual in need of a red blood cell transfusion

31. A method of using the composition of Claim 10 comprising delivery of the composition into an individual in need of a red blood cell transfusion

32. A method of using the composition of Claim 11 comprising delivery of the composition into an individual in need of a red blood cell transfusion

33. A method of using the composition of Claim 12 comprising delivery of the composition into an individual in need of a red blood cell transfusion

34. A method of using the composition of Claim 14 comprising delivery of the composition into an individual in need of a red blood cell transfusion

35. A method of using the composition of Claim 17 comprising delivery of the composition into an individual in need of a red blood cell transfusion

36. A method of using the composition of Claim 18 comprising delivery of the composition into an individual in need of a red blood cell transfusion

37. A method of using the composition of Claim 19 comprising delivery of the composition into an individual in need of a red blood cell transfusion

38. An *ex vivo* method of treating a red blood cell composition comprising:
(a) providing a red blood cell composition suspected of containing a bacterium, wherein said bacterium, if present, is reacted with an antigen masking compound such that the bacterium is more infectious than a bacterium that is not reacted with the antigen masking compound,

(b) contacting the red blood cell composition with a compound that substantially inactivates the bacterium that may be present in the composition, under conditions that result in substantial inactivation of the bacterium present, if any; and

(c) contacting the red blood cell composition with a sufficient amount of the antigen masking compound such that the antigen masking compound binds to the red blood cells and substantially masks red blood cell antigens under conditions that significantly reduce the immunogenicity of the red blood cells such that transfusing the red blood cell composition into an antigen mismatched animal would result in a reduced immune reaction compared to the immune reaction of transfusing an untreated red blood cell composition.

39. The method of claim 38, wherein said compound that inactivates the bacterium has an affinity for nucleic acids.

40. The method of claim 39, wherein said compound that inactivates the bacterium comprises an effector group that reacts to bond covalently to the nucleic acid.

41. The method of claim 40, wherein said compound that inactivates the bacterium comprises a nucleic acid binding ligand.

42. The method of claim 41, wherein said effector group is selected from the group consisting of a mustard group and a mustard group equivalent.

43. The method of claim 38, wherein said antigen masking compound comprises polyethylene glycol.

44. The method of claim 38, wherein said antigen masking compound comprises a polyethylene glycol derivative.

45. The method of claim 38, wherein said antigen masking compound is selected from the group consisting of an activated polyethylene glycol and an activated polyethylene glycol derivative.

46. A red blood cell processing system comprising:

a) a composition of red blood cells suspected of containing a pathogen wherein the red blood cell composition has been treated such that the pathogen is substantially inactivated and wherein red blood cell antigens are substantially masked so that the transfusion of the treated red blood cells into an antigen mismatched animal would result in a reduced immune reaction compared to the immune reaction of an untreated red blood cell composition, and

b) a blood bag containing the red blood cell composition, wherein the red blood cell composition is suitable for delivery to an individual.

47. The system of claim 46, wherein *in vivo* survival of the red blood cells after circulating for 24 hours following transfusion is greater than 75%.

48. The system of claim 47, wherein said *in vivo* survival of greater than 75% is maintained after storage of the red blood cells for up to 14 days at 4 °C.

49. The system of claim 47, wherein said *in vivo* survival of greater than 75% is maintained after storage of the red blood cells for up to 35 days at 4 °C

50. The composition of claim 47, wherein said *in vivo* survival of greater than 75% is maintained after storage of the red blood cells for up to 42 days at 4 °C

51. The system of claim 46, wherein when the red blood cells are Rh positive, *in vitro* binding of anti-D antibody to the treated red blood cells is reduced by at least 90% compared to the untreated red blood cells.

52. The system of claim 46, wherein when the red blood cells are Rh positive, *in vitro* binding of anti-D antibody to the treated red blood cells is reduced by at least 95% compared to the untreated red blood cells.

53. The system of 46, wherein when the red blood cells are Rh positive, *in vitro* binding of anti-D antibody to the treated red blood cells is reduced by at least 99% compared to the untreated red blood cells.

54. The system of claim 46, wherein when a pathogen is present, at least 3 logs of said pathogen has been inactivated.

55. The system of claim 54, wherein said pathogen is a bacterium.